

7700007

PLC PROGRAMMING

COURSE INFORMATION

Credits: 2

PREREQUISITES AND/OR COREQUISITES

A minimum grade of C in 7900001 ELECTRICAL SYSTEMS

COURSE DESCRIPTION

An introduction to the fundamental principles of programmable controller operation. Topics to be presented will include basic system configurations and hardware, relay-equivalent instructions, timers and counters, data manipulation commands, and searching/program documentation.

COURSE GOALS

- I. Identify and configure all input/output hardware.
- II. Identify, list the function, and interpret the indicators located on the processor module.
- III. Demonstrate how to create and delete program files, data files, and data base files.
- IV. Explain how to utilize the memory map to monitor memory usage and examine file elements and words.
- V. Explain how to utilize and recognize proper addressing procedures and instruction commands appropriate for the PLC family of processors.
- VI. Explain how to create and execute a given program to verify it's operation.
- VII. Explain how to debug and correct any programming or logic errors which may be encountered.
- VIII. Explain how to save and retrieve the PLC processor memory using long-term storage.

STUDENT LEARNING OUTCOMES

- I. PLC Overview.
 - A. Identify and configure all input/output hardware.
 - B. Use PC-based software package to create a PLC ladder program.
- II. Introduction to PLC Hardware and Programming.
 - A. Identify, list the function, and interpret the indicators located on the processor module.
 - B. Install and power-up a PLC system, including the rack, power supply, and computer programmer.
 - C. Create and delete program files, data files, and data base files.
 - D. Utilize the memory map to monitor memory usage, create and delete data files, and examine file elements and words.
- III. Relay Logic Instructions.
 - A. Utilize and recognize instructions and proper addressing procedures for relay-type instructions.
 - B. Create and execute a program to verify it's operation.

- C. Debug and correct any programming or logic errors which may be encountered.
- IV. Timer and Counter Instructions.
 - A. Utilize and recognize instructions and addressing procedures for the instructions: TON, TOF, RTO, RES, CTD, and CTU.
 - B. Create and execute a program to verify it's operation.
 - C. Debug and correct any programming or logic errors which may be encountered.
- V. Saving and Loading PLC Files
 - A. Save the PLC processor memory onto long-term storage.
 - B. Load a program file from long-term storage into the PLC processor.
- VI. Forcing from the Computer
 - A. Describe the operation of the force function.
 - B. Describe safety considerations required when forcing.
- VII. Program Documentation
 - A. Create instruction symbols and descriptions in a ladder program.
 - B. Create rung titles and rung descriptions in a ladder program.
- VIII. Searching with the Terminal
 - A. Perform global and local searching operations for specified addresses.
 - B. Perform global and local searching operations for specified instructions.
- IX. Move instruction
 - A. Use the Mov instruction to move integers in the PLC memory.
- X. Arithmetic and Logic Instructions
 - A. Use arithmetic and logic instructions to create PLC programs.
- XI. Comparison Instructions
 - A. Use word comparison instructions to make decisions in a PLC program.
- XII. Program Control Instructions
 - A. Understand the operation of the Jump and Label instructions in programming.
 - B. Understand the use and benefit of the JSR and Return instructions in PLC programming.

COURSE MATERIALS

Programmable Logic Controllers Hardware and Programming 4th Edition, Max Rabiee, Goodheart-Wilcox Publisher, ISBN#978-1-63126-932-5

GRADING CRITERIA

Students can expect to be graded on Written Assignments, Quizzes, Tests, Lab Activities, and Attendance. There is currently no scheduled time available to makeup classes or labs that are missed.

PARTICIPATION/ATTENDANCE POLICY

Students can expect that attendance/participation will be a part of their final grade, and determined by the instructor at his/her discretion. Students are encouraged to attend every class as regular attendance as it contributes to successful course completion and will impact the final grade.

COURSE EXPECTATIONS

For successful completion of this course, students are expected to Read Course Material, Complete all Assignments, Take Notes, Study and Participate in classroom discussions.

ACADEMIC INTEGRITY AND CONDUCT POLICY

The integrity of a class and program rests on the principle that the grades awarded to students must reflect only their own individual efforts and achievement. Students are required to perform the work specified by the instructor and are responsible for the content of work submitted, such as papers, reports, examinations, and other work. Violations of academic integrity include various types of plagiarism and cheating.

Plagiarism

Plagiarism includes, but is not limited to:

- Using exact words from a source without appropriate crediting
- Cutting and pasting electronically from any source without appropriate crediting
- Using wording and/or sentence structure too close to the original in paraphrasing
- Using visual images in whole or in part created by someone else without appropriate crediting
- Buying a paper and presenting any part of it as your own
- Borrowing any part of a paper and presenting it as your own without appropriate crediting
- Falsifying or inventing any information or citation in an academic exercise

Cheating

Cheating includes, but is not limited to:

- Obtaining or giving assistance in any academic work such as on quizzes, tests, homework, etc., without instructor's consent
- Taking a test or course or turning in work for someone else
- Allowing someone to take a test or course or turn in work in your name
- Using crib notes or electronic devices to get unauthorized assistance on tests or other in-class work
- Using work from another class or previous semester without instructor consent

CLASS CANCELLATION POLICY

Class meetings can occasionally be called off due to bad weather, check the local news and radio for information or call 319-296-4444 for the current status of college closings, class cancelations, delay start, or early dismissal information.

STUDENTS' SPECIAL NEEDS STATEMENT

Hawkeye Community College (HCC) strives for student-centered, quality education with flexibility to allow for students' special needs. Students with physical, mental, or learning disabilities should contact the Special Needs Coordinator in Student Services at 319-296-4014 or specialneeds@hawkeyecollege.edu to learn how to apply for accommodations at HCC. Or, visit our website for more information and forms: <http://www.hawkeyecollege.edu/students/services/student-disability-services/default.aspx>

NONDISCRIMINATION STATEMENT

Hawkeye Community College does not discriminate on the basis of sex; race; age; color; creed; national origin; religion; disability; sexual orientation; gender identity; genetic information; political affiliation; or actual or potential parental, family, or marital status in its programs, activities, or employment practices as required by Iowa Code §§ 216.6 and 216.9, Titles VI and VII of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d and 2000e), the Equal Pay Act of 1973 (29 U.S.C. § 206, et seq.), Title IX (Educational Amendments, 20 U.S.C. §§ 1681-1688), Section 504 (Rehabilitation Act of 1973, 29 U.S.C. § 794), and Title II of the Americans with Disabilities Act (42 U.S.C. § 12101, et seq.). Veteran status is also included to the extent covered by law. Any person alleging a violation of equity regulations shall have the right to file a formal complaint. Inquiries concerning application of this statement should be addressed to: John Clopton (Equity Coordinator and Title IX Coordinator for Employees) or Nancy Henderson (Title IX Coordinator for Students), Hawkeye Community College, 1501 East Orange Road, P.O. Box 8015, Waterloo, Iowa 50704-8015, telephone 319-296-4405, email: equity-titleIX@hawkeyecollege.edu, or the Director of the Office for Civil Rights, U.S. Department of Education, Citigroup Center, 500 W. Madison, Suite 1475, Chicago, IL 60661, phone number 312/730-1560, fax 312/730-1576.

DISCLAIMER

This syllabus is believed to be accurate at the time it was written. However, the instructor reserves the right to make changes as deemed necessary, provided notification is given to the students.

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